

DATA SHEET

BSP121

N-channel enhancement mode
vertical D-MOS transistor

Product specification

1998 Apr 01

Supersedes data of April 1995

File under Discrete Semiconductors, SC13b

N-channel enhancement mode vertical
D-MOS transistor

BSP121

DESCRIPTION

N-channel enhancement mode vertical D-MOS transistor in a miniature SOT223 envelope and designed for use as a line current interrupter in telephone sets and for application in relay, high-speed and line-transformer drivers.

FEATURES

- Direct interface to C-MOS, TTL, etc.
- High-speed switching
- No secondary breakdown

QUICK REFERENCE DATA

Drain source voltage	V_{DS}	max.	200 V
Gate-source voltage (open drain)	$\pm V_{GSO}$	max.	20 V
Drain current (DC)	I_D	max.	350 mA
Total power dissipation up to $T_{amb} = 25\text{ }^{\circ}\text{C}$	P_{tot}	max.	1.5 W
Drain-source on-resistance $I_D = 400\text{ mA}; V_{GS} = 10\text{ V}$	$R_{DS(on)}$	typ. max.	4.5 Ω 6.0 Ω
Transfer admittance $I_D = 400\text{ mA}; V_{DS} = 25\text{ V}$	$ Y_{fs} $	min. typ.	200 mS 350 mS

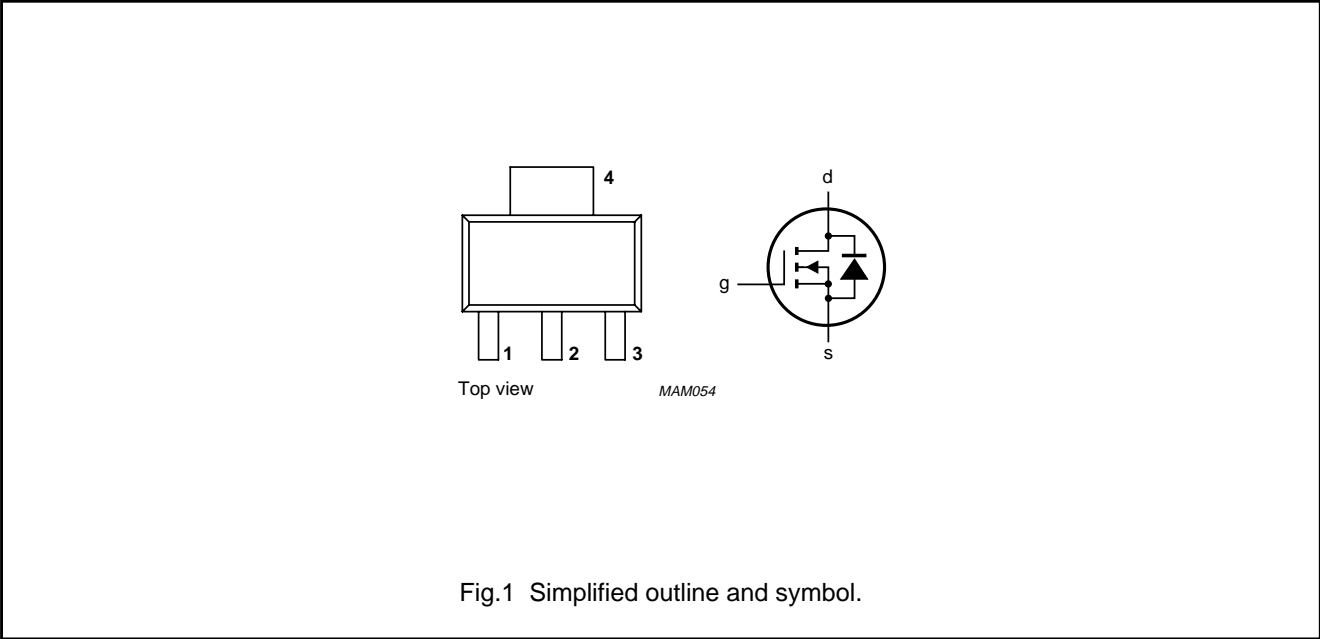
PINNING - SOT223

- 1 = gate
- 2 = drain
- 3 = source
- 4 = drain

Marking code

BSP121

PIN CONFIGURATION



N-channel enhancement mode vertical D-MOS transistor

BSP121

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Drain-source voltage	V_{DS}	max.	200 V
Gate-source voltage (open drain)	$\pm V_{GSO}$	max.	20 V
Drain current (DC)	I_D	max.	350 mA
Drain current (peak)	I_{DM}	max.	1.2 A
Total power dissipation up to $T_{amb} = 25\text{ }^{\circ}\text{C}$ (note 1)	P_{tot}	max.	1.5 W
Storage temperature range	T_{stg}		-65 to $+150\text{ }^{\circ}\text{C}$
Junction temperature	T_j	max.	$150\text{ }^{\circ}\text{C}$

THERMAL RESISTANCE

From junction to ambient (note 1)	R_{thj-a}	=	83.3 K/W
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Note

1. Device mounted on an epoxy printed-circuit board $40\text{ mm} \times 40\text{ mm} \times 1.5\text{ mm}$; mounting pad for the drain lead min. 6 cm^2 .

N-channel enhancement mode vertical D-MOS transistor

BSP121

CHARACTERISTICS

$T_j = 25\text{ }^{\circ}\text{C}$ unless otherwise specified

Drain-source breakdown voltage

$I_D = 10\text{ }\mu\text{A}$; $V_{GS} = 0$

$V_{(BR)DSS}$ min. 200 V

Drain-source leakage current

$V_{DS} = 160\text{ V}$; $V_{GS} = 0$

I_{DSS} max. 1.0 μA

$V_{DS} = 60\text{ V}$; $V_{GS} = 0$

I_{DSS} max. 200 nA

Gate-source leakage current

$\pm V_{GS} = 20\text{ V}$; $V_{DS} = 0$

$\pm I_{GSS}$ max. 100 nA

Gate threshold voltage

$I_D = 1\text{ mA}$; $V_{DS} = V_{GS}$

$V_{GS(th)}$ min. 0.8 V
max. 2.8 V

Drain-source on-resistance

$I_D = 400\text{ mA}$; $V_{GS} = 10\text{ V}$

$R_{DS(on)}$ typ. 4.5 Ω
max. 6.0 Ω

Transfer admittance

$I_D = 400\text{ mA}$; $V_{DS} = 25\text{ V}$

$|Y_{fs}|$ min. 200 mS
typ. 350 mS

Input capacitance at $f = 1\text{ MHz}$

$V_{DS} = 25\text{ V}$; $V_{GS} = 0$

C_{iss} typ. 45 pF
max. 60 pF

Output capacitance at $f = 1\text{ MHz}$

$V_{DS} = 25\text{ V}$; $V_{GS} = 0$

C_{oss} typ. 15 pF
max. 25 pF

Feedback capacitance at $f = 1\text{ MHz}$

$V_{DS} = 25\text{ V}$; $V_{GS} = 0$

C_{rss} typ. 3.5 pF
max. 10 pF

Switching times (see Figs 2 and 3)

$I_D = 250\text{ mA}$; $V_{DD} = 50\text{ V}$; $V_{GS} = 0$ to 10 V

t_{on} typ. 5 pF
max. 10 pF

t_{off} typ. 15 ns
max. 20 ns

N-channel enhancement mode vertical
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BSP121

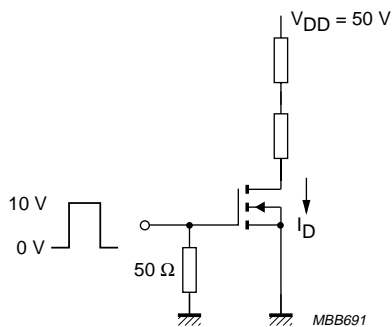


Fig.2 Switching time test circuit

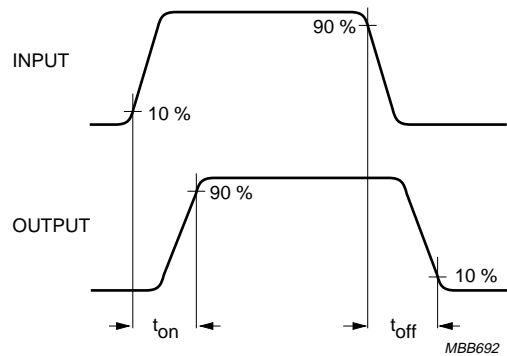


Fig.3 Input and output waveforms.

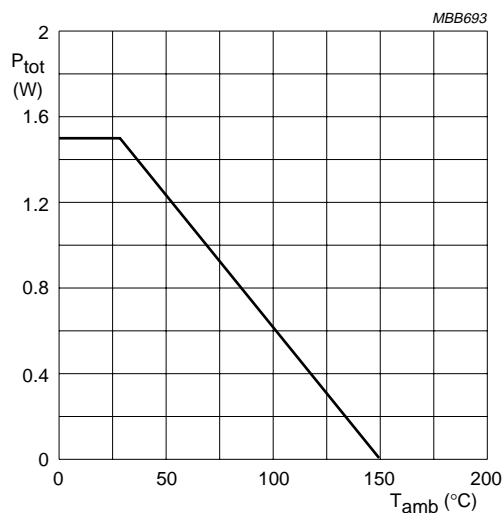


Fig.4 Power derating curve.

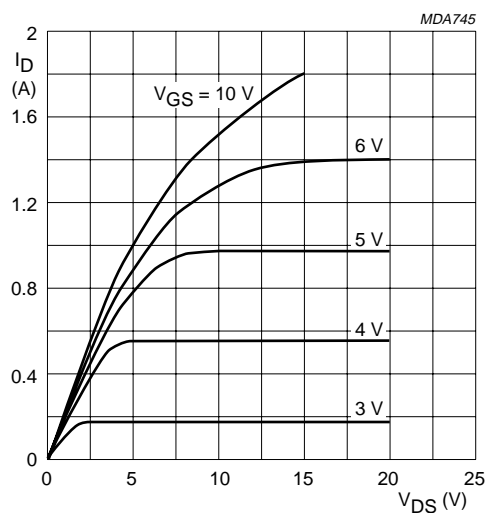


Fig.5 Output characteristic; $T_j = 25$ °C; typical value.

N-channel enhancement mode vertical
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BSP121

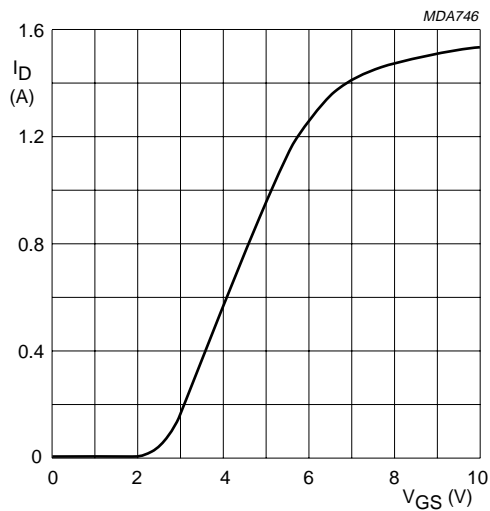


Fig.6 Transfer characteristic; $V_{DS} = 10\text{ V}$;
 $T_j = 25\text{ }^\circ\text{C}$; typical values.

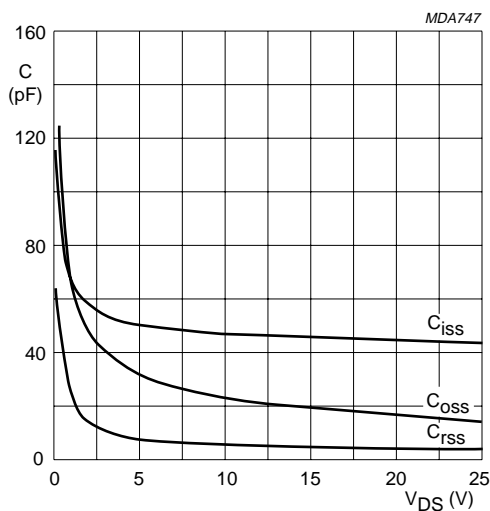


Fig.7 Capacitance as a function of drain-source
voltage; $V_{GS} = 0$; $f = 1\text{ MHz}$; $T_j = 25\text{ }^\circ\text{C}$;
typical values.

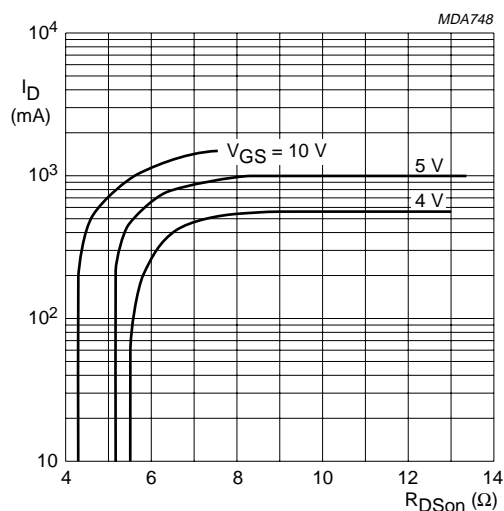


Fig.8 $T_j = 25\text{ }^\circ\text{C}$; typical values.

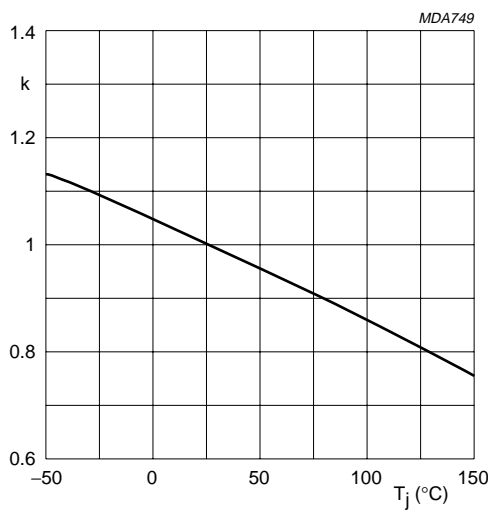
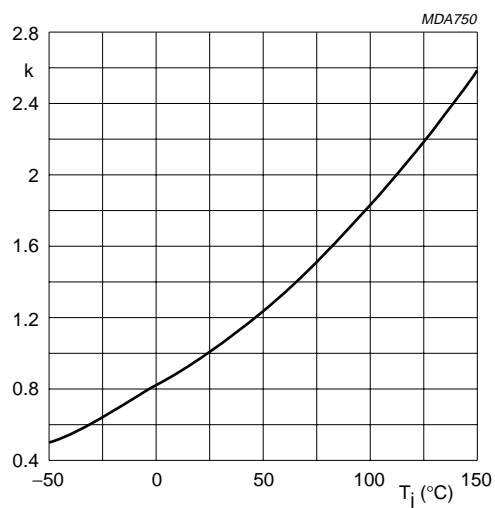


Fig.9
$$k = \frac{V_{GS(th)} \text{ at } T_j}{V_{GS(th)} \text{ at } 25\text{ }^\circ\text{C}};$$

 $V_{GS(th)}$ at 1 mA; typical values.

N-channel enhancement mode vertical D-MOS transistor

BSP121**Fig.10**

$$k = \frac{R_{DS(on)} \text{ at } T_j}{R_{DS(on)} \text{ at } 25^\circ\text{C}};$$

at 400 mA/10 V; typical values.

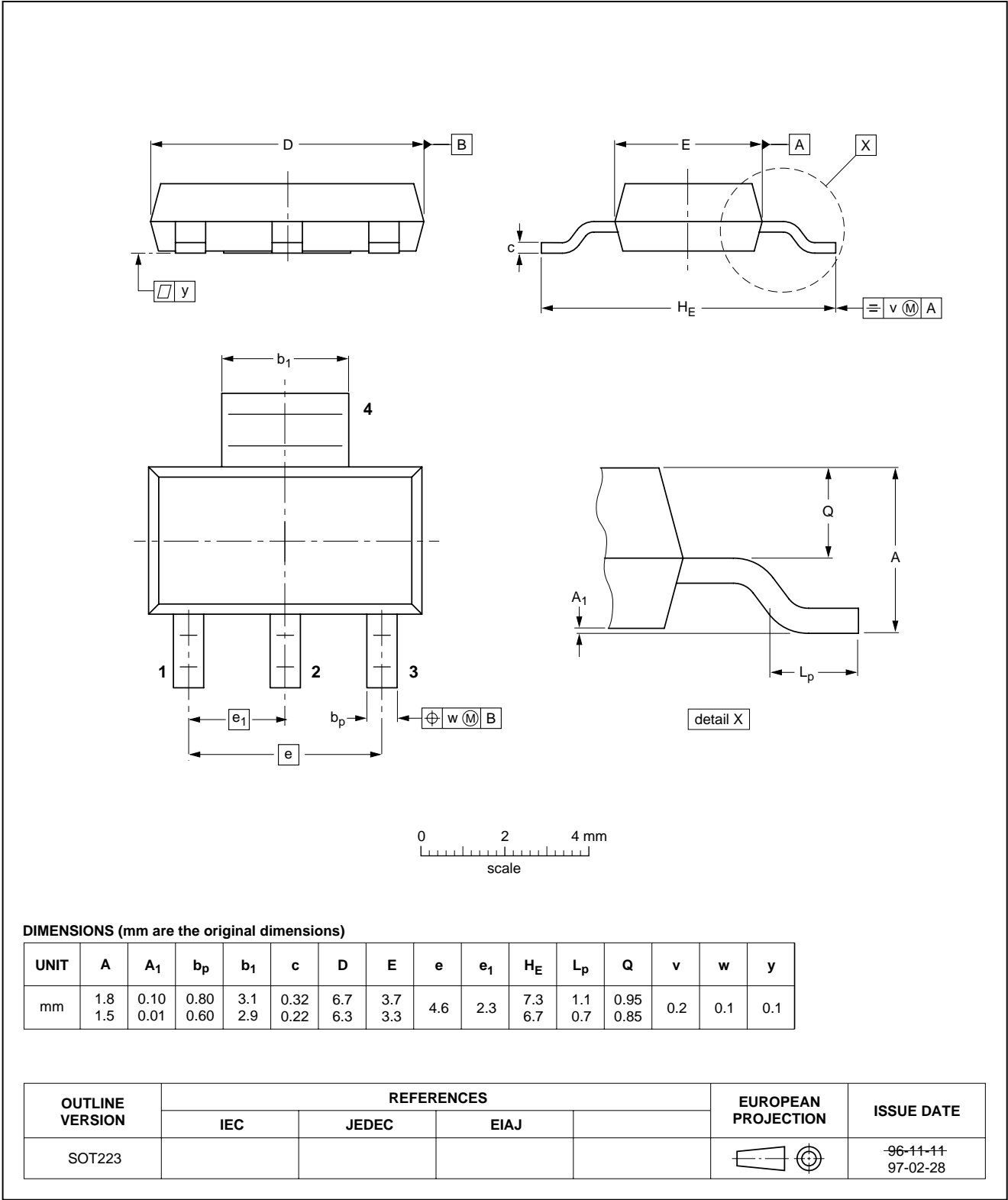
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BSP121

PACKAGE OUTLINE

Plastic surface mounted package; collector pad for good heat transfer; 4 leads

SOT223



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BSP121**DEFINITIONS**

Data sheet status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Application information	
Where application information is given, it is advisory and does not form part of the specification.	

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N-channel enhancement mode vertical
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NOTES

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